

Appl. No. 10/030,118
Amendment dated: October 22, 2004
Reply to OA of: June 22, 2004

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1(original). A BOD-measuring biosensor, comprising a measuring unit, an electric current-detecting unit, and a recording unit serving to record a variation in the detected electric current, the measuring unit being composed of a mediator-less biofuel cell, the biofuel cell including:

cathodic and anodic compartments defined therein and contained with a conductive medium, respectively;

an anode arranged in the anodic compartment;

a cathode arranged in the cathodic compartment; and

an ion exchange membrane interposed between the cathodic and anodic compartments and serving to divide the anodic compartment from the cathodic compartment, wherein the anodic compartment is fed with a sample containing electrochemically active bacteria.

2(original). The BOD-measuring biosensor of Claim 1, in which the measuring unit further comprises a potentiostat serving to control a potential of the anodic compartment.

3(currently amended). A method for measuring BOD of a sample using the BOD-measuring biosensor according to Claim 1, the method comprising:

electrically connecting the anode to the cathode via a resistor;

introducing the anodic compartment with nitrogen to maintain in an anaerobic condition, while introducing the cathodic compartment with oxygen to maintain in an aerobic condition;

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densely enrichment culturing an electrochemically active bacterium present in the sample in the anodic compartment; and

measuring electric current being generated while employing the ~~densely~~ enrichment cultured, electrochemically active bacteria as a microbial catalyst.

4(original). A mediator-less biofuel cell type biosensor for the measurement of organic substance concentration, the biosensor comprising a measuring unit, an electric current-detecting unit, and a recording unit serving to record a variation in the detected electric current, the measuring unit comprising:

cathodic and anodic compartments defined therein and contained with a conductive medium, respectively;

an anode arranged in the anodic compartment;

a cathode arranged in the cathodic compartment; and

an ion exchange membrane interposed between the cathodic and anodic compartments and serving to divide the anodic compartment from the cathodic compartment, wherein the anodic compartment contains a sample containing a single species of an electrochemically active bacterium serving to catabolize a desired organic substance.

5(original). A method for measuring a concentration of an organic substance using the biosensor according to Claim 4, the method comprising:

adding a sample to be measured to the anodic compartment while continuing to feed air to the cathodic compartment to maintain the cathodic compartment at a voltage different from the anodic compartment; and

measuring an electric current generated from the consumption of an organic substance contained in the sample by the electrochemically active bacterium, whereby the concentration of the organic substance is measured.

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6(currently amended). A method for ~~densely~~ enrichment culturing electrochemically active bacteria present in active sludge and wastewater, using the mediator-less biofuel cell included in the biosensor according to Claim 4, the method comprising:

- adding the active sludge and the wastewater to the anodic compartment;
- electrically connecting the anodic compartment to the cathodic compartment via a resistor;

- introducing nitrogen to the anodic compartment to maintain the anodic compartment in an anaerobic condition while introducing air to the cathodic compartment to maintain the cathodic compartment in an aerobic condition;

- whereby a bacterium present in the active sludge and wastewater is ~~densely~~ enrichment cultured without a separate electron receptor.

7(currently amended). A method for measuring BOD of a sample using the BOD-measuring biosensor according to Claim 2, the method comprising:

- electrically connecting the anode to the cathode via a resistor;
- introducing the anodic compartment with nitrogen to maintain in an anaerobic condition, while introducing the cathodic compartment with oxygen to maintain in an aerobic condition;

- ~~densely~~ enrichment culturing an electrochemically active bacterium present in the sample in the anodic compartment; and

- measuring electric current being generated while employing the ~~densely~~ enrichment cultured, electrochemically active bacteria as a microbial catalyst.